

Section II. OPERATION OF PRECISION GUNNERY SYSTEM (PGS)

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2-10. GENERAL.

a. This section describes operation of the Precision Gunnery System (PGS). Various control panel displays, functions, and options are available to the vehicle commander and training controller. During training exercises, operation of the PGS is transparent to the vehicle crew. The crew operates the vehicle weapons systems in their normal mode of operation and crew input to PGS is not required. The control panel allows the commander to view gunnery results, monitor ammunition status, and system status.

b. The PGS training exercise is set up by the instructor using the Training Data Retrieval System (TDRS) personal computer. The instructor sets the ammunition allowance. This minimizes the operation of the control panel for the crew. Refer to TM 9-6920-711-12&P-1.

c. Target engagement feedback is provided by the PGS in the form of audio tones and visual effects of tracer and burst. When simulating firing on a target vehicle, the appropriate sound signature will accompany the firing of the weapon. In the sight, the gunner can see the visual effects of tracers, burst on target, and burst on ground. Listed below are the audio and visual effects provided during operation of the PGS.

(1) Audio tones and control panel messages indicate to target vehicle that they are under fire or destroyed.

(2) Strobe lights indicate to firing vehicle that the target is hit or destroyed.

2-11. CREW OPERATIONS.

a. Set MASTER SWITCH to ON (see TM 08594A-10/2) and power up turret and DIM36TH sight (see TM 08594A-10/1A).

2-11. CREW OPERATIONS (Con't).

b. **Ammunition.** The crew can monitor remaining ammunition during an exercise using the control panel.

(1) Select SI and press ENTER.

SI	RM	GD					
AL							
SU							
TE							
CF							
	SIMULATION						

(2) Select RM and press ENTER.

SI	RM	GD					
AL							
SU							
TE							
CF							
	REMAINING AMMO.						

(3) To monitor main gun ammunition, select MW.

SI	RM	GD				MW	CO
AL							TURRET HULL
SU	AP						70 240
TE	HE						140 180
CF							
	MAIN WEAPON ENTER = UPLOAD						

2-11. CREW OPERATIONS (Con't).

NOTE

- Perform step (4) to upload main gun ammunition.
- During an upload sequence, PGS can transfer ammunition from hull to turret until turret rack is full. If remaining hull ammunition is not enough to fill the turret rack, the remaining ammunition is transferred.
- Upload time is programmed on TDRS memory card by training controller.
- If ESC is pressed during an upload sequence, process is stopped and ammunition is not transferred.
- The time until upload is completed is displayed on control panel for the selected ammunition.
- When upload is completed for one ammunition type, press ESC.

(4) Using up/down arrow buttons, select ammunition to be uploaded and press ENTER.

(5) To monitor coax ammunition, select CO and press ENTER.

SI	RM	GD				MW	CO
AL	7.62						TURRET
SU							HULL
TE							0400
CF							1200
	MAIN WEAPON						ENTER = UPLOAD

NOTE

- Perform step (6) to upload coax ammunition.
 - During an upload sequence, PGS can transfer ammunition from hull to turret until turret rack is full. If remaining hull ammunition is not enough to fill the turret rack, the remaining ammunition is transferred.
 - Upload time is programmed on TDRS memory card by training controller.
 - If ESC is pressed during an upload sequence, process is stopped and ammunition is not transferred.
 - The time until upload is completed is displayed on control panel for selected ammunition.
 - When coax upload is completed, press ESC.
- (6) Using up/down arrow buttons, select ammunition to be uploaded and press ENTER.
- (7) Press ESC twice.

2-12. RESULTS.

- a. **General.** Results of the training exercise can be displayed numerically or graphically, or the result presentation can be turned off.

b. Numerical Presentation.

- (1) Numerical presentation allows for immediate feedback and result presentation of hit coordinates and type of ammunition.

- (2) Results are presented in a pop-up screen on the control panel.

- (3) A pop-up screen appears until a new result is displayed or a control panel button is pressed.

	<div style="text-align: center;"> <p>HIT</p> <p>→ 0.8 ↓ 1.0</p> <p>R. 1540 m</p> <p>HE</p> </div>						
	EXAMPLE						

- C. **Graphics Display (GD).**

- (1) Graphic presentation allows for immediate feedback and is used for panel gunnery training exercises where display of the hit in relation to the target outline is preferred over actual hit coordinates.

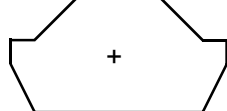
NOTE

This screen identifies the target silhouette and hit position (x) in relation to target center of mass (+).

- (2) Select SI and press ENTER.

- (3) To view results graphically, select GD and press ENTER. Graphics display will show the target template of the ammo fired and round impact point.

- (4) Press ESC to exit graphics display.

SI		GD					
AL							
SU							
TE							
CF							
	GRAPHICS DISPLAY						

- d. **Result Presentation Off.** For force-on-force exercises, the instructor can program the TDRS memory card to store the training results without displaying them on the control panel. This method of presentation requires the crew to engage their targets based on visual effects of tracers and burst provided in the sights.

2-14. TARGET RESULT PRESENTATION (Con't).

(4) **WEAPON KILL.** The vehicle is hit and the weapon system is damaged. The crew can move the vehicle, but cannot fire any weapons.

(5) **KILL.** The vehicle is hit and has sustained a catastrophic kill. The crew cannot move the vehicle or fire any weapons.

b. Elevation and azimuth impact point on vehicle in relation to center of mass.

c. Aspect angle of incoming round. The aspect angle is divided into 12 sectors according to the clock.

2-15. AUDIO INDICATIONS.

a. **General.** The system uses sound to indicate to the crew that different events have taken place. The audio indications can be divided into firing system, target system, and system error audio indications.

b. **Audio Indications of Firing System.** During loading and firing of ammunition, the following audio indications are heard through the vehicle intercom:

(1) Firing of 25 mm gun.

(2) Firing of coax machine gun.

c. **Audio Indications of Target System.** When a PGS system is fired upon from other simulator-equipped vehicles, the vehicle intercom indicates that the vehicle is being fired upon.

(1) **NEAR MISS.** If the vehicle had a near miss, two long "beeps" followed by a voice command of "near miss" are transmitted on the vehicle intercom.

(2) **HIT (NO KILL).** If the vehicle is hit by a round, but not killed, 4-6 "beeps" followed by a voice command of "hit" are transmitted on the vehicle intercom.

(3) **HIT (MOBILITY KILL).** If the vehicle is hit by a round and the vehicle is immobilized, 4-6 "beeps" followed by a voice command of "mobility kill" are transmitted on the vehicle intercom.

(4) **HIT (WEAPON KILL).** If the vehicle is hit by a round and the weapon system is immobilized, 4-6 "beeps" followed by a voice command of "weapon kill" are transmitted on the vehicle intercom.

NOTE

If panel gunnery training is used, the target system is auto-activated after 5 seconds. The audio indication stops and the system is operational. The kill is stored on the TDRS memory card together with auto-activation for After Action Review (AAR).

(5) **KILL.** If the vehicle is hit by a round and killed, a voice command of "kill" followed by "beeps" for 30 seconds are transmitted on the vehicle intercom.

d. **System Errors.** Verbal audio indication of "SYSTEM ERROR, CHECK CONTROL PANEL" is provided through vehicle intercom for system errors.

2-16. VISUAL INDICATIONS OF TARGET SYSTEM.

The target system indicates the effect of an engagement with the retro detector unit strobe lights. The effect directs the gunner/commander's further engagement of the target. The following visual indications are given by the target system:

2-16. VISUAL INDICATIONS OF TARGET SYSTEM (Con't).

- a. **NEAR MISS.** If a target receives a near miss, retro detector unit strobe light blinks 2 times.

NOTE

Weapon kill and mobility kill are also indicated with 4-6 indicators.

- b. **HIT.** If the target is hit, but not killed, retro detector unit strobe light blinks 4-6 times.

NOTE

If panel gunnery training is used, the target system is auto-activated after 5 seconds. The indication stops and the system is operational.

- c. **KILL.** If the target is hit and killed by a round or by a control gun (CGUN), retro detector unit strobe light blinks continuously until the system is reset by the CGUN.

2-17. CGUN INDICATIONS DURING OPERATION.

NOTE

Refer to TM 9-6920-711-12&P-1 for more information on the CGUN.

- a. **CGUN KILL Message.** The instructor has the capability to kill vehicles during an exercise using the CGUN. If CG KILL appears on the control panel, the crew must stop the vehicle and await further orders. The CG KILL message, together with the time, is stored on the TDRS memory card for AAR.

	CG KILL						

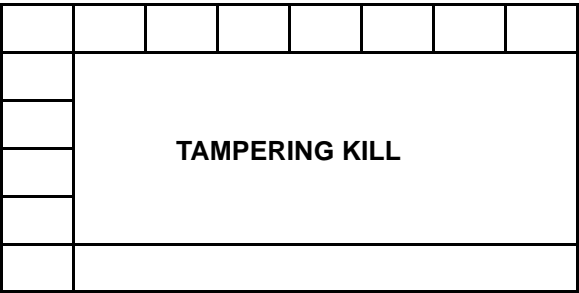
- b. **CGUN RESET Message.** The instructor has the capability to restore vehicles which have been killed during an exercise. If a vehicle is killed then fired upon by a CGUN using RESET, the control panel stops indicating KILL and the strobe light and vehicle intercom indication are inhibited. A basic load of ammunition is given to the vehicle (ammunition amount defined on TDRS memory card) together with the capability to fire. The time also appears with the RESET message and is stored on the TDRS memory card for AAR.

- c. **CGUN TEST, Controller Access, TIME MARK Messages.** The vehicle crew does not have to respond to all CGUN functions transmitted to their vehicle. TEST, controller access, and TIME MARK are not presented on the control panel. They are stored on the TDRS memory card for AAR. The training controller receives confirmation that the CGUN message has been received by the vehicle through one indication in each retro detector unit strobe light.

2-18. TAMPER INDICATIONS.

a. PGS senses, indicates, and stores attempts to tamper with the system during combat exercises. A pop-up screen appears on the control panel when a tamper has occurred. If the tamper is not corrected within 10 seconds, a TAMPERING KILL is indicated and PGS is inoperable.

b. The following attempts to tamper are stored and indicated during COMBAT MODE exercises:



(1) **Disconnection of Retro Detector Units.** If a retro detector unit cable is removed, a tamper is indicated and the crew has 10 seconds to connect the cable before a TAMPERING KILL is indicated.

(2) **Disconnection of Hull Defilade Detector Units.** If a hull defilade detector unit cable is removed, a tamper is indicated and the crew has 10 seconds to connect the cable before a TAMPERING KILL is indicated.

(3) **Disconnection of Power.** The system stores on the TDRS memory card each time the vehicle is powered down. If the system has been switched off, it can be read on during AAR.

(4) **Alteration of Control Panel Functions.** If ammunition or other training parameters are changed, it can be found during AAR.

(5) **Disconnection of Cables.** Any cable disconnection within the system is stored as BIT errors on the TDRS memory card and found during AAR.

(6) **Removal of TDRS Memory Card.** If the TDRS memory card is removed and inserted, it is noted on the memory card and can be seen during AAR.

2-19. SCALED TRAINING.

a. PGS has the means to provide 1/10 and 1/2 scale range gunnery training. By using scaled ranges and PGS-equipped vehicles, crews can simulate 25 mm gun and coax machine gun firing.

b. Perform vehicle preparation instructions (see paragraph 2-1).

c. Perform installation procedures (see paragraphs 2-4 and 2-5).

NOTE

- **PGS alignment can be performed with the TDRS memory card programmed for full, 1/2, or 1/10 scale panel gunnery.**
 - **For full and 1/2 scale gunnery, use a boresight panel equipped with a retro reflector unit positioned as close to 1000 meters as possible.**
 - **For 1/10 scale gunnery, use a boresight panel equipped with a retro reflector unit positioned as close to 120 meters as possible.**
- d. Perform test and alignment procedures (see paragraphs 2-6 and 2-7).
- e. Conduct scaled gunnery training (see paragraphs 2-10 through 2-18).

2-20. TRACKING TRAINING MODE.

a. PGS has the capability to perform tracking training exercises in panel gunnery mode against targets with a retro reflector installed at the center of mass of target. PGS may also perform tracking training exercises in combat mode against targets with turret installed retro reflector units.

b. Vehicle preparation instructions.

(1) Position Light Armored Vehicle (LAV) on level ground 1000 m from a target panel containing a retro reflector unit (see TM 08594A-10/2).

NOTE

Do not perform a scaled boresight. PGS requires a full range boresight during scaled gunnery.

(2) Confirm boresight status (see TM 08594A-10/1A).

WARNING

- **Vehicle MASTER SWITCH and turret power must be OFF before connecting or disconnecting system components/cables. Failure to follow this warning may cause turret or 25 mm gun movement, resulting in injury or death to personnel.**
- **TURRET DRIVE LOCK must in locked position before connecting or disconnecting system components/cables. Failure to follow this warning may result in injury or death to personnel.**

(3) Set MASTER SWITCH to OFF position (see TM 08594A-10/2). Place TURRET DRIVE LOCK to LOCKED position and turn turret power OFF (see TM 08594A-10/1A).

- c. Unpack PGS components (see paragraph 2-2).
- d. Perform preliminary inspection instructions (see paragraph 2-3).
- e. Install exterior components and cables (see paragraph 2-4).
- f. Install interior components and cables (see paragraph 2-5).
- g. Perform test procedures (see paragraph 2-6).
- h. Perform the following PGS alignment procedures (see paragraph 2-7).
 - (1) Alignment target placement
 - (2) Vehicle preparation
 - (3) Cant alignment
 - (4) Laser alignment
- i. Perform control panel setup procedures (see paragraph 2-8).
- j. Ensure that TDRS memory card has been set up for target tracking training and that tracer and burst presentation are switched OFF (see TM 9-6920-711-12&P-1).
- k. Operation of target tracking training for 25 mm gun or coax.
 - (1) Select ammunition (see TM 08594A-10/1A).
 - (2) Set WPN/ARM switch to ARM (see TM 08594A-10/1A).

2-20. TRACKING TRAINING MODE (Con't).

NOTE

- The collection of tracking data will start when gunner's or commander's palm switch is pressed.
- The collection of tracking data will continue until one of the following events occur: tracking time has elapsed (TDRS memory card programmed time), firing of the main gun or coax, or gunner's or commander's palm switch is released.
 - (3) Aim with boresight cross.

NOTE

- Valid tracking data will only be stored if the trigger has been activated within the tracking time selected.
- No tracking data will be stored if the gunner or commander release the palm switch prior to activating the trigger or if selected tracking time expires.
 - (4) Perform target tracking training.
 - (5) Set the WPN/ARM switch to SAFE (see TM 08594A-10/1A).
 - (6) To continue 25 mm or coax target tracking training, repeat steps (1) through (4).